

REMARKS

The Office Action dated July 13, 2005, has been received and carefully noted. The above amendments to claim 36 and the following remarks are submitted as a full and complete response thereto.

Claims 1-37 and 39-70 stand rejected and pending and under consideration.

Applicants thank the Examiner for indicating allowable subject matter in claims 18-29, 31-35, 38, 56-67, and 69-70. It respectfully noted that claim 38 has been cancelled, and that the limitations of claim 38 have been introduced into independent claim 36, it is respectfully requested that independent claim 36 is allowable, as is dependent claim 37, which depends from claim 36.

REJECTIONS UNDER 35 U.S.C. § 103(a):

In the Office Action, at page 2, claims 1-17, 30, 36-37, 39-55, and 68 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U. S. Patent No. 6,831,893 of Ben Nun et al. ("Nun") in view of U.S. Patent No. 6,628,617 of Karol et al. ("Karol"). The Office Action took the position that Nun describes all the recitations of independent claims 1, 30, 36, 39, and 68 and related dependent claims, except those "involving limitations of 'separate flow, forwarding and translation databases to perform the above flow control functions.'" Applicant respectfully traverses this rejection and requests reconsideration and allowance.

Independent claim 1, upon which claims 2-29 are dependent, recites a method for balancing transmission unit traffic over network links. The method includes disposing transmission units into flows, grouping flows into first flow lists, each of the first flow lists corresponding to a selected network link, and determining a traffic metric representative of a traffic load on the selected network link. The method further includes responsive to the traffic metric, regrouping flows into second flow lists corresponding to the selected network link, the regrouping balancing the transmission unit traffic among the network links, and transmitting the respective second flow list over the respective selected network link.

Independent claim 30, upon which claims 31-35 are dependent, recites a method for balancing transmission unit traffic over heterogeneous speed network links. The method includes disposing transmission units into flows, wherein each of the transmission units includes one of source information, destination information, and a combination thereof, and the disposing comprises characterizing each of the transmission units according to one of the source information, the destination information, and a combination thereof. Each of the transmission units comprises one of a packet, a frame, a cell, and a combination thereof. The method also includes grouping flows into first flow lists, each of the first decreasing-size-ordered linked flow lists corresponding to a selected network link; determining a traffic metric representative of a traffic load on the selected network link; responsive to the traffic metric, regrouping flows into second decreasing-size-ordered linked flow lists corresponding to the selected network link, the

regrouping balancing the transmission unit traffic among the network links; and transmitting the respective second flow list over the respective selected network link using a predetermined link-layer transmission protocol, wherein the predetermined link-layer transmission protocol communicates the transmission unit traffic over the network links in cooperation with a network-layer protocol. The network-layer protocol cooperates with a transport-layer protocol to communicate the transmission unit traffic across the network links, and wherein each of the network-layer protocol and the transport-layer protocol is one of a connectionless protocol and a connection-based protocol.

Independent claim 36, upon which claims 37-38 are dependent, recites a method for transmitting transmission units through a network. The method includes receiving a transmission unit from a transmission unit source; classifying the transmission unit according to a predetermined flow characteristic; and selecting a preselected network link over which the transmission unit is to be transmitted. The method further includes transmitting the transmission unit over the preselected network link; and e. monitoring the operation of a plurality of preselected network links, and reassigning the predetermined flow characteristic from a first preselected network link to a second preselected network link, if the first preselected network link operationally fails.

Independent claim 39, upon which claims 40-67 are dependent, recites a computer program product recorded on a computer readable medium for balancing transmission unit traffic over network links, including computer readable program code which

disposes transmission units into flows, computer readable program code which groups flows into first flow lists, each of the first flow lists corresponding to a selected network link, computer readable program code which determines a traffic metric representative of a traffic load on the selected network link. A computer readable program code is included which, responsive to the traffic metric, re-assigns flows into second flow lists corresponding to the selected network link, the re-assigning balancing the transmission unit traffic among the network links. A computer readable program code is included which transmits the respective second flow list over the respective selected network link.

Independent claim 68, upon which claims 69-70 are dependent, recites a network load balancer in a communication network having network links. The network load balancer includes a flow synthesizer that receives transmission units from a transmission unit source, and synthesizes flows characteristic of selected transmission units, and a link classifier, coupled with the flow synthesizer and the network links. The link classifier classifies the network links relative to a predetermined flow metric, and assigns selected flows to selected network links responsive to the predetermined flow metric, the selected transmission units corresponding to the selected flows being communicated with the communication network through the respective selected network links.

As will be discussed below, a combination of Nun and Karol fails to teach or suggest all the elements of any of the presently pending claims.

Nun generally describes a classifier 260 determining a flow to which a data packet belongs based on the source and destination IP addresses contained in the header HDR of

the data packet. See column 8, lines 11-15. In addition to determining the flow of a data packet based on the IP addresses, the classifier 260 of Nun may also determine the flow based on the source and destination port values contained in the header HDR of the data packet. See column 8, lines 15-34. Furthermore, the classifier 260 can additionally identify a specific flow of the data packet based on the protocol value contained in the header HDR of the data packet. See column 8, lines 34-37. However, Nun fails to teach or suggest, at least, "grouping flows into first flow lists, each of the first flow lists corresponding to a selected network link," as recited in independent claim 1. Instead of grouping flows into first flow lists, Nun arranges data packets into a particular flow based on the header information of each data packet. The classifier 260 of Nun may identify a particular flow of the data packet based on the protocol value, but does not teach or suggest that once the flows are identified, these flows are further grouped "into first flow lists" as recited in independent claim 1.

In addition, according to Nun, the classifier 260 receives information from each of the packet processors PP1 to PPN indicating the relative load on each of the packet processors PP1 to PPN. See column 9, lines 28-32. Then, the classifier 260 assigns a new flow to the packet processor PP1, PP2, . . . , or PPN that has the smallest load.

Nun fails to teach or suggest, at least, "responsive to the traffic metric, regrouping flows into second flow lists corresponding to the selected network link, the regrouping balancing the transmission unit traffic among the network links," as recited in

independent claim 1. Instead, Nun receives information pertaining to the processor PP1 to PPN load of data packets, not of grouped flows as in the present invention.

Nun does not regroup flows into second flow lists. Rather, the classifier 260 of Nun assigns a new flow to the packet processor PP1, PP2, . . . , or PPN that has the smallest data packet load.

According to Nun, if the classifier 260 determines that the particular data packet belongs to the particular flow and determines that one of the packet processors PP1 to PPN has previously been designated as the particular flow processor, the classifier 260 determines that the particular data packet should be output to the particular data processor. See column 9, lines 32-41. Nun provides loading the packet processors PP1 to PPN based on the flow of a data packet. Nun does not teach or suggest, at least, "regrouping flows into second flow lists," as recited in independent claim 1. Instead, based on the load of each packet processor PP1 to PPN or header information in each data packet, the classifier 260 assigns the particular packet processor PP1 to PPN to output the flow associated with the data packet.

The Office Action cites Nun's stream of packets as corresponding to the claimed flows. It is respectfully noted that a stream of packets may correspond to a flow, as explained, for example, by Nun at Col. 8, l. 39. The Office Action then cites Nun's flow as corresponding to the flow list. This is an improper characterization of the art. A flow cannot be a flow list. A particular flow may be, in some instances, the only member of a particular flow list, but a flow list can include a plurality of flows.

Additionally, the Office Action similarly misunderstands Nun with respect to the assigning a new flow to a packet processor that has the smallest load, as described by Nun at col. 9, ll. 31-35. It is respectfully noted that Nun assigns the flow to a packet processor not based on (or in response to) traffic information, but based on the reported load of the PPN.

Even if assigning the flow to the PPN were in response to traffic information (not admitted), that does not correlate to the claimed "regrouping balancing the transmission unit traffic among the network links."

Certain embodiments of the claimed invention can improve flow of data in a network, by reassigning flows of packets so that they can be transmitted over various links in the network in response to traffic issues. The cited reference merely describes a network interface with multitasking ability by means a plurality of packet processors. A flow that comes into Nun's network interface directed to a link, will exit the network interface directed to the same link and without any particular relation to the traffic status of that link. In certain embodiments of the present invention, in contrast, the flow may be redirected to another link, or, for another example, may be prioritized in a decreasing size order.

Nun's Figure 2 displays a flow diagram of data within the network interface. Note that the only two physical access layers are one at the upstream side of the flow diagram, and one at the downstream flow diagram. The unlabeled bus to which PP1, PP2, and PPN are attached is not a network. It is an internal bus of a network interface. Thus PP1,

PP2, and PPN are not nodes of a network. The chief way in which Nun attempts to achieve some improvement in a network is by processing speed improvements. For example, Nun states that "fewer processors PP1 to PPN are required to process the data packets **transmitted to the network**, and the overall operation of **the network** is enhanced."

Thus, Nun is not directed to "balancing transmission unit traffic over heterogenous speed network links" as recited in claim 30, or "balancing transmission unit traffic over network links" as recited in claims 1 and 39, nor is it a "network load balancer in a communication network having network links." The only kind of balancing that Nun performs is a kind of internal balancing amongst multiple processors in the course of processing the data. In contrast, the claims of the present invention are referring to balancing data "over heterogenous speed network links," "over network links," or "in a communication network having network links."

Karol does not remedy the deficiencies of Nun. Karol is directed to a technique for internetworking traffic on connectionless (CL) and connection-oriented (CO) networks. Karol generally describes CL-CO gateways and the accompanying hardware and software modules.

The Office Action cites Karol only for having several types of databases. Whether Karol discloses such databases is moot. Karol does not teach the features of the claim which Applicants have noted that Nun does not teach. Therefore, Karol does not remedy the deficiencies of Nun.

Additionally, Nun and Karol could not be combined. Karol is directed to a CL-CO gateway. Nun is directed to a network interface in an implicitly CL network (note Nun's header processor 250). Thus Nun could not serve as Karol's CL-CO gateway, even if databases were added to Nun. Accordingly, one of ordinary skill in the art would not be motivated to combine Nun and Karol.

It is respectfully noted that independent claim 36 has been amended incorporating allowable subject matter, and therefore it is respectfully requested that independent claim 36 be allowed.

Accordingly, in view of the foregoing, it is respectfully asserted that Nun and Karol do not teach or suggest all the elements of any of the presently pending claims.

CONCLUSION:

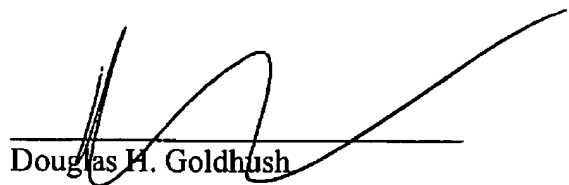
In view of the above, Applicant respectfully submits that each of claims 1-17, 30, 36-37, 39-55 recites subject matter which is neither disclosed nor suggested in the cited prior art. Applicant therefore respectfully requests that each of claims 1-37 and 39-70 be allowed, and that this application be passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the Applicant's undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, the Applicant respectfully petitions for an appropriate extension of time.

Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,



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Enclosure: Petition for One-Month Extension of Time
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